Claims

1. A process for hydroprocessing a heavy hydrocarbon oil, comprising contacting a heavy hydrocarbon oil in the presence of hydrogen with a mixture of hydroprocessing catalyst I and hydroprocessing catalyst II, wherein

catalyst I comprises a Group VIB metal component and optionally a Group VIII metal component on a porous inorganic carrier, said catalyst having a specific surface area of at least 100 m^2/g, a total pore volume of at least 0.55 ml/g, at least 50% of the total pore volume in pores with a diameter of at least 20 nm (200 Å), and 10-30% of the total pore volume in pores with a diameter of at least 200 nm (2000 Å), and

catalyst II comprises a Group VIB metal component and optionally a Group VIII metal component on a porous inorganic carrier, said catalyst having a specific surface area of at least 100 m^2/g, a total pore volume of at least 0.55 ml/g, at least 75% of the total pore volume in pores with a diameter of 10-120 nm (100-1200 Å), 0-2% of the total pore volume in pores with a diameter of at least 400 nm (4000 Å), and 0-1% of the total pore volume in pores with a diameter of at least 1000 nm (10000 Å).

2. The process of claim 1 wherein catalyst II comprises a catalyst IIa, a catalyst IIb, or a mixture thereof, wherein

catalyst IIa comprises 7 to 20 wt.% of a Group VIB metal component, calculated as trioxide on the weight of the catalyst, and 0.5 to 6 wt.% of a Group VIII metal component, calculated as oxide on the weight of the catalyst, on a porous inorganic carrier, said catalyst having a specific surface area of 100-180 m^2/g, a total pore volume of at least 0.55 ml/g, at least 85% of the total pore volume in pores with a diameter of 10-120 nm (100-1200 Å), 0-2% of the total pore volume in pores with a diameter of at least 400 nm (4000 Å), and 0-1% of the total pore volume in pores with a diameter of at least 1000 nm (10000 Å) and

catalyst IIb comprises 7 to 20 wt.% of a Group VIB metal component, calculated as trioxide on the weight of the catalyst, and 0.5 to 6 wt.% of a Group VIII metal component, calculated as oxide on the weight of the catalyst, on a porous inorganic carrier preferably comprising at least 3.5 wt.% of silica, calculated on the weight of the final catalyst, said catalyst having a specific surface area of at least 150 m^2/g, a total pore volume of at least 0.55 ml/g, at least 75% of the total pore volume in pores with a diameter of 10-120 nm (100-1200 Å), 0-2% of the total pore volume in pores with a diameter of at least 400 nm (4000 Å), and 0-1% of the total pore volume in pores with a diameter of at least 1000 nm (10000 Å).

3. The process of claim 2 wherein catalyst IIb additionally comprises a Group IA metal component and/or a Group VA metal component, in particular phosphorus.

4. The process of claim 2 wherein a mixture of catalysts IIa and IIb is applied, wherein catalyst IIa has at least 50% of its pore volume in pores with a diameter above 200 Å, and catalyst IIb has at most 50% of its pore volume in pores with a diameter above 200 Å.

5. The process of claim 1 wherein the heavy hydrocarbon feed of which at least 50 wt.%, preferably at least 80 wt.%, boils above 538°C, and which comprises at least 2 wt.% of sulfur and at least 5 wt.% of Conradson Carbon.

6. The process of claim 1 which is carried out in an ebullating bed.

7. A mixture of catalysts comprising

a catalyst I which comprises a Group VIB metal component and optionally a Group VIII metal component on a porous inorganic carrier, said catalyst having a specific surface area of at least 100 m^2/g, a total pore volume of at

least 0.55 ml/g, at least 50% of the total pore volume in pores with a diameter of at least 20 nm (200 Å), and 10-30% of the total pore volume in pores with a diameter of at least 200 nm (2000 Å), and

a catalyst II which comprises a Group VIB metal component and optionally a Group VIII metal component on a porous inorganic carrier, said catalyst having a specific surface area of at least 100 m^2/g, a total pore volume of at least 0.55 ml/g, at least 75% of the total pore volume in pores with a diameter of 10-120 nm (100-1200 Å), 0-2% of the total pore volume in pores with a diameter of at least 400 nm (4000 Å), and 0-1% of the total pore volume in pores with a diameter of at least 1000 nm (10000 Å).

8. The catalyst mixture of claim 7 wherein catalyst II comprises a catalyst IIa, a catalyst IIb, or a mixture thereof, wherein

catalyst IIa comprises 7 to 20 wt.% of a Group VIB metal component, calculated as trioxide on the weight of the catalyst, and 0.5 to 6 wt.% of a Group VIII metal component, calculated as oxide on the weight of the catalyst, on a porous inorganic carrier, said catalyst having a specific surface area of 100-180 m^2/g, a total pore volume of at least 0.55 ml/g, at least 85% of the total pore volume in pores with a diameter of 10-120 nm (100-1200 Å), 0-2% of the total pore volume in pores with a diameter of at least 400 nm (4000 Å), and 0-1% of the total pore volume in pores with a diameter of at least 1000 nm (10000 Å) and

catalyst IIb comprises 7 to 20 wt.% of a Group VIB metal component, calculated as trioxide on the weight of the catalyst, and 0.5 to 6 wt.% of a Group VIII metal component, calculated as oxide on the weight of the catalyst, on a porous inorganic carrier preferably comprising at least 3.5 wt.% of silica, calculated on the weight of the final catalyst, said catalyst having a specific surface area of at least 150 m^2/g, a total pore volume of at least 0.55 ml/g, at least 75% of the total pore volume in pores with a diameter of 10-120 nm (100-1200 Å), 0-2% of the total pore volume in pores with a diameter of at least 400 nm (4000 Å), and 0-1% of the total pore

volume in pores with a diameter of at least 1000 nm (10000 Å)which comprises 7 to 20 wt.% of a Group VIB metal component, calculated as trioxide on the weight of the catalyst, and 0.5 to 6 wt.% of a Group VIII metal component, calculated as oxide on the weight of the catalyst, on a porous inorganic carrier, said catalyst having a specific surface area of 100-180 m^2/g, a total pore volume of at least 0.55 ml/g, at least 85% of the total pore volume in pores with a diameter of 10-120 nm (100-1200 Å), 0-2% of the total pore volume in pores with a diameter of at least 400 nm (4000 Å), and 0-1% of the total pore volume in pores with a diameter of at least 1000 nm (10000 Å).

9. The catalyst mixture of claim 8 wherein catalyst IIb additionally comprises a Group IA metal component and/or a Group VA metal component, in particular phosphorus.

10. The catalyst mixture of claim 8 wherein a mixture of catalysts IIa and IIb is applied, wherein catalyst IIa has at least 50% of its pore volume in pores with a diameter above 200 Å, and catalyst IIB has at most 50% of its pore volume in pores with a diameter above 200 Å.